

Curricular mapping: an anti-stress tool for new medical students

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Abstract

Objective: Recently, The University of Ottawa implemented an innovative curriculum for the incoming undergraduate medical class. Among many revisions, the curriculum became much more integrated and moved from 12 educational “blocks” to 6 integrative “units.” While this approach to the integration of content was pedagogically robust, it proved to be extremely challenging for first-year medical students. Many students found it difficult to understand how concepts fit together. The purpose of this study was to create a tool that could map the trajectory of the curriculum in order to reduce stress among students. **Method:** During the summer of 2009, two students produced a “Foundations Unit Map.” This map grouped lectures into seven interconnected, color-coded disciplines. Subfields were bridged on the map by “integrative” topics that intentionally straddled more than one discipline. **Result:** The map was presented to the incoming class of the subsequent academic year. Some students reported that they felt less anxious about the range of topics to be covered as foundational to medicine and others found the presentation of all of the topics overwhelming, while others found that the map did not alter their stress levels. **Conclusion:** Curriculum maps can be effective tools for faculty and students, particularly where curricula are presented in innovative and challenging ways.

Keywords:

Curricular mapping, Stress, Medical Students.

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Introduction

In 2008, the University of Ottawa implemented an innovative new curriculum for the incoming undergraduate medical class. Among many significant revisions, the curriculum became much more integrated and moved from education in “blocks” to “units.” The blocks consisted of discrete educational elements (i.e., cardiology, the musculoskeletal system, and immunology) that were taught in a “bottom-up” fashion, beginning with the basics of each entity and building up to more complex topics within the field. The block would be taught in full and then followed by an examination that tested only the material that was presented in that section. The new curriculum, in contrast, was designed to challenge students to integrate the different fields of medicine and the topics within those fields. Thus, emphasis was taken away from presenting the material as discrete “blocks” and exams became cumulative.

The first unit that was taught in this new format, which was entitled “Foundations,” was conceived as an introduction to the broad field of medicine and its subfields. While this approach is both innovative and pedagogically robust, the Foundations Unit proved to be challenging for first-year students. Many of them found it difficult to understand how the concepts fit together; thus, they experienced high levels of stress prior to exams. The purpose of this study was to find a tool that could lower the students’ stress that resulted from the new curriculum and, thus, improve the learning experience.

Structure of the “Foundation Unit” in the undergraduate medical curriculum at the University of Ottawa

The University of Ottawa’s curriculum is taught without textbooks. Instead, the focus is on lectures, seminars, laboratories, and case-based learning. The topics that are

covered in the Foundation Unit can vary greatly and are not necessarily taught in a “bottom-up” or linear manner. Students get different pieces of the puzzle and, as the unit goes on, should be able to put the pieces together. By the end of the unit, students should have all of the pieces that are necessary to organize their knowledge. Students are expected to prepare for exams by revisiting earlier pieces and reorganizing their puzzle, thus integrating new information with topics covered in earlier lectures. For example, Week 4 begins with topics on white blood cells and immunity, but lectures entitled “Tolerance and Immune Regulations” and “Hypersensitivity and Autoimmune Disease” do not appear until Week 6. At the end of Week 6, the pieces of the immunology puzzle should start to come together: As students review their notes, they can trace the development of blood cells in bone marrow, the development of white blood cells from progenitor cells, ascertain how these white blood cells comprise the immune system, and determine what can go wrong during immune functioning. In the meantime, they have also had lectures on other topics, including early embryological development, and have been visiting the anatomy laboratory once a week for several weeks. Thus, they also possess the pieces of the puzzle that they need in order to trace the development of the embryo and its spine and should be able to visualize the parts of the spine from their anatomy lectures and experience in the anatomy lab. Learning different medical topics in parallel occurs as the information becomes integrated in the mind of the student.

At the end of the Foundations Unit, each student wrote a mandatory evaluation of his/her learning experience. These evaluations were analyzed by authors and the main criticism was that students often did not understand why they were learning a particular topic on a particular day or why

that topic was a part of foundations of medicine: "Why are we learning immunology so early in the semester, when we have not thoroughly learned hematology?," or "Why is autopsy covered in the Foundations Unit?" Students also stated that they felt many topics were rushed: "Why did we cover all of bacteriology in only four hours? I spent a whole year learning this material in my previous studies." The students' comments on the evaluations illustrated that this educational approach can be quite challenging for the first-year students exposed to this new curriculum, particularly those students who had not had any prior training in physiology.

The University of Ottawa accepts students from various academic backgrounds; while some have already had exposure to the material that was covered in their first year of medical school, others have very little background knowledge. Depending on their educational backgrounds, students had different experiences with the Foundations Unit. Some students suffered from the stress of too much new material, while others fared well and complained the material was too easy. The difference between these two types of students seemed to be their educational background: those who had already studied all of this material were able to go to lectures and understand what piece of the puzzle they were receiving and where it would eventually fit; many of those who were seeing the material for the first time felt lost and overwhelmed.

The relationship between medical curricula and stress

It has been proven that medical school contains stressors that can affect the well-being of medical students (1, 2). Stressors specific to medical school include significant financial debt, a vast body of knowledge that

must be learned in a short period of time, long work hours, sleep deprivation, loss of extra-curricular time and activities, conflict with co-workers, career ambitions and competition for residency programs, the seriousness of the medical practice, and coming to terms with human mortality. Given these stressors, it comes as no surprise that stress, anxiety, and depression are higher among medical students in comparison to other undergraduate student groups (3, 4). A study of 304 first- and second-year medical students in Norway showed a 3-fold greater lifetime prevalence of major depression compared to the average population (5). Stress among medical students has been shown to range from 25% to 75% of the student body (6). A three-year prospective study in 2007 that explored burnout and psychiatric morbidity of 81 medical students in Sweden showed that 27% of students met DSM-IV criteria for a psychiatric diagnosis. Burnout was found to be related to both personal and environmental factors (7).

An analysis of coping strategies among medical students has shown that no specific coping strategies are common to medical students (7). However, exercise and recreational activities, support from family and friends, and spirituality are all reported to promote a greater sense of well-being (7). Having a stable and supportive family or spouse was also found to be protective against burnout and psychiatric dysfunction (8, 9). However, given the time commitment that is required to successfully complete medical school, many students find it challenging to uphold a work-life balance by maintaining their extracurricular and social activities.

A study of 275 medical students in Scotland found that their major stressors were associated with their coursework. Specifically, students worried about study behaviour and performance. The perceived lack of

availability of learning materials added to stress and a fear of failure (4).

Study rationale

We hypothesize that some of the stress experienced by students may be alleviated if they were presented with a “unit map” for the first unit in medical school.

The unit map was designed to be both an overview of major subjects covered in the upcoming unit and a visual representation of how discrete topics are interconnected. The intention was for the map to serve as a study guide for major subjects and an aid for the synthesis of the material.

Students can search by keyword to find the topic they learned that day and view what lectures will eventually fill in the blanks leading up to the lecture and what will follow (as if one were looking at the picture on the front of a puzzle box). They can also search by keyword if they are curious about whether a hole in their knowledge will eventually be filled in or whether it is their responsibility to cover the material on their own. For example, the unit presented material that detailed the etiology of a patient afflicted with pneumonia when infected with HIV (Objective 1290), and how co-infection with HIV can affect the treatment outcomes of those with viral hepatitis (Objective 221) before students were given a lecture describing HIV. This caused some of these students to panic and spend time teaching themselves about HIV so they could understand that day’s lectures. Had students been able to search “HIV,” they would have seen a pending lecture covering the basics of HIV, saving themselves much stress, time, and effort. We hypothesize that presenting the unit as an organized whole will guide studying, decrease academic stress, and allow students to have more confidence in the faculty and the new curriculum.

Method

After the first iteration of the new curriculum, two first-year medical students, under the supervision of several faculty members, created the Foundations Unit Map. The students were selected due to their active involvement in student committees and different academic backgrounds. They were in the unique position of perceiving the strengths and weaknesses of the curriculum and its effect on student well-being. The Foundations Unit of the new University of Ottawa Medical School was chosen because it truly was an integrated unit.

The “Foundations Unit Map” (Appendix 1) grouped lectures into seven interconnected, color-coded disciplines, rather than by time. These categorizations included hematology and immunology (blue), the musculoskeletal system (yellow), bacteria/viruses/parasites (pink), genetics (red), embryology (brown), biochemistry and cell biology (green), and pharmacology (orange). They were bridged on the map by “integrative” topics that straddled more than one discipline.

For example, the lectures on arthritis integrated bacteria, the musculoskeletal system, and cell biology, so its box would be bordered by pink, yellow, and green. Oncology topics (bordered by purple) were scattered throughout the map, bridging various disciplines together. Different types of classes (lectures vs. case-based learning vs. self-learning modules vs. laboratories) were written in different colored fonts in the colored boxes.

The map was created by reviewing the academic schedule and categorizing each lecture, tutorial, lab, case-based learning module, and self-learning module into a specific field of medicine. This was organized by using Microsoft Word. The original map was created by using colored construction

paper that was cut into rectangles and organized on a large poster board. The map developers played around with reorganizing the boxes so the integration topics linked to the appropriate colored sections on the map, fitting all pieces together. The organized final product made the Foundations Unit seem simple and logical.

The map was designed to be adaptable so it may reflect any potential changes in the curriculum. Thus, it could not be created as a picture file (for example, by using Adobe Photoshop), as it would be difficult to change the text once the file was saved. Project developers decided it would be best to create a large poster (56 inches x 56 inches) in Microsoft Power Point. This program allows students to zoom in to see details, such as individual lecture titles, and zoom out to see the unit as a whole. Students can download the file and keep it on their computers as a reference. It is also possible to change the name of a lecture, add or remove lecture boxes, or add the date on which each lecture will be given.

At the beginning of the next academic year, the Foundations Unit Map was presented to the incoming class.

Result

To date, the students' and/or faculties' perceptions of this new tool have not been systematically collected, but the informal comments about it have been encouraging. With the ability to "see" the entire Foundations Unit mapped from beginning to end, most students seem less anxious about what topics are covered as foundational to medicine. However, some students reported that the unit map was overwhelming, while others stated that it neither helped nor worsened their stress levels.

Discussion

The feedback received from the students who used the Foundation unit map illustrates that medical classes are comprised of students with heterogeneous learning styles and stress levels. A learning tool that may be helpful to one student may not be helpful to another.

Curricular maps can be effective tools for teachers and a useful resource for some students.

Particularly where curricula are innovative and challenging, maps can provide students with a useful orienting structure. These maps build upon the ways in which adults learn (10, 11) by presenting a framework for understanding concepts and, perhaps more importantly, for visualizing the connections between them. With the addition of the Foundations Map, students will be better oriented within this integrative education, ultimately building the academic groundwork upon which their future medical career stands. Finally, this model of curricular mapping can be expanded to all other units, offering the prospect of medical training with all concepts appropriately linked together.

Future directions

The map's creators hope that this model can be expanded to include other units in the first preclerkship year and extend throughout the rest of the preclerkship and—eventually—the entire MD program. Using a program such as Adobe Flash, an animated map can eventually be created in which students can see all four years of their education laid out in a simple, color-coded way, and then click on individual years to open up a new screen that will show them the units they will cover during that year, and then click on the unit to open up a new screen that will show them the lectures that will be covered in that unit, etc. This model could be a very useful way to keep track of where one is and where one is going

in the medical education program at the University of Ottawa.

In the future, it would be useful to systematically evaluate students' use of and reaction to unit maps, in order to quantify their usefulness as a study tool and a means to stress reduction.

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References

1. Miller GD, Miller EC, Peck OC. Medical student needs assessment and student affairs programming. *J Med Educ* 1981;56:518-20.
2. Supe AN. A study of stress in medical students at Seth G.S. Medical College. *J Postgrad Med* 1998;44:1-6.
3. Stecker T. Well-being in an academic environment. *Med Educ* 2004;38:465-78.
4. Moffat K, McConnachie A, Ross S, Morrison J. First year medical student stress and coping in a problem-based learning medical curriculum. *Med educ.* 2004; 38: 482–491
5. Tysen R, Vaglum P, Gronvold NT, Ekeberg O. The impact of job stress and working conditions on mental health problems among junior house officers. A nationwide Norwegian prospective cohort study. *Med Educ* 2000;34:374-84.
6. Mosley TH Jr., Perrin SG, Neral SM, Dubbert PM, Grothues CA, Pinto BM. Stress, coping and well-being among third year medical students. *Acad Med* 1994;69:765-7.
7. Stern M, Norman S, Komm C. Medical students' differential use of coping strategies as a function of stressor type, year of training and gender. *Behav Med* 1993;18:173-80.
8. Tysen R, Vaglum P, Gronvold NT, Ekeberg O. Factors in medical school that predict PG mental health problems in need of treatment. A nationwide and longitudinal study. *Med Educ* 2000;35:110-20.
9. Zoccolillo M, Murphy GE, Wetzel RD. Depression among medical students. *J Affect Disord* 1986;11:91-6.
10. Ausubel DP. Educational psychology: A cognitive view. New York, NY: Holt, Reinhart & Winston; 1968.
11. Novak JD, Gowin DB. Learning how to learn. New York, NY: Holt, Reinhart & Winston; 1968.

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Appendix 1: Foundation Unit Map

